Yosemite National Park Monumentation Database

Max Leveridge, M.En. (GIP)
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Introduction

Currently, much of Yosemite National Park's (YOSE) Facilities data is stored in multiple CAD files accessible to a limited number of staff. For example, the survey monument records across 21 areas of the park were stored in over 50 separate CAD files. As a result, it became difficult for park staff to locate monuments and keep up-to-date records of which monuments still exist. To better maintain this scattered dataset, the GIS and Design and Engineering branches decided to create a consolidated database that will live on the YOSE Enterprise GIS (EGIS) server. While there were 3 databases on the YOSE Theme Manager before this project, these were created using outdated data from 2015 and were location-specific rather than for the entirety of the park. Therefore, the goal of this project was to create a single, up-to-date parkwide monumentation dataset that could be accessed by all park staff, as well as create a map book that can be used in the field to help locate monuments and control points.

Methodology

Between October 2019 and March 2020, a Geoscientists-in-the-Parks (GIP) GIS intern worked with YOSE GIS and YOSE Design and Engineering to design, populate, and verify the new database using data exported from the existing CAD files. The database was designed to closely follow the National Park Service [Monumentation Spatial Data Standard](), with additional park-specific fields to account for the type of survey (monuments such as survey disks, control points such as rebar and caps, and if a monument is destroyed or missing), last known elevation information, and a YOSE-specific database ID.

Data were prepared in Autodesk Civil 3D 2019 by simplifying existing CAD files and exporting the monumentation AECC (Land Desktop) Points, COGO Points, and Block data. These data were then prepared, and an initial quality check was performed in Microsoft Excel, and saved as a tab delimited file. Data were imported to the database in ArcGIS Pro v2.3.2 using a Python v2.7.14 script tool designed by the GIS intern that processed and added the CAD information to the database. Database fields consistent to each import dataset (and not included in the CAD export) were populated via set values in the tool. These monuments were then checked once more for duplicate locations and to ensure all data were properly imported.

Field visits were then performed for database quality checks. These checks involved using an offline-enabled Collector map of monuments to determine if the monuments are found within approximately 5 feet of the stored locations, collecting more information (including Stamping, Set By, Condition, and more) to further populate the database, and taking situational images of the monuments (including close-up images of the monument face and images in the four cardinal directions) to help locate the monuments in the future.

Results

This project resulted in a database containing a total of 2,060 monuments, control points, and destroyed or missing monuments. Of those, 348 were deemed monuments, 1614 were deemed control points, and 98 were deemed destroyed or missing. During the field visits, approximately 60 sites were visited, 54 of which were accessible (i.e., not inaccessible due to significant snow or being under machinery or equipment), and only 25 of which were located.

Discussion

The database is now published on the YOSE EGIS Theme Manager, where it can be accessed by park staff in all divisions. The data will be maintained by YOSE Design and Engineering so it can be regularly updated as new monuments are installed and additional field verification is performed. Several limitations arose as a result of the original data and were addressed if possible. These included a discrepancy in datums where most of the Tuolumne area was in NAD 1983 / NAVD 1988 and only a portion of Tuolumne Meadows in NAD 1927 / NGVD 1929. The rest of the park was in NAD 1927 / NGVD 1929. Additionally, some monuments in Glen Aulin High Sierra Camp, Sunrise High Sierra Camp, and Tamarack Flat Campground could not be imported due to missing location information in the CAD files.

Future work is needed to further this dataset. Most importantly, field visits are necessary to populate empty fields in the EGIS database and to ensure the monuments still exist. Furthermore, a future project includes appropriately renaming monuments to eliminate duplicate names and, if possible, to provide more information within the monument name. This dataset should also be linked to the National Oceanic and Atmospheric Administration's National Geodetic Survey database to help populate and locate the monuments in future. Lastly, as this is a dynamic dataset, the monuments included as of this initial publication still leave 2,006 monuments subject to verification, resulting in the need for future updates of this map book.

Designed By

Max Leveridge, Design and Engineering

Special Thanks To

Nicole Belle Isle, Design and Engineering
Elizabeth Hale, Physical Sciences and Landscape Ecology
Matt Outhier, Design and Engineering

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